

REMARKS/ARGUMENTS

Claims 1-29 are active in the case. Claims 13-29 stand withdrawn from consideration.

Reconsideration is respectfully requested.

Claim Amendments

Claims 24, 29 and 13 have been amended in order to make minor and obvious corrections thereto. Accordingly, no new matter has been introduced into the case, and entry of the amendments and new claim is respectfully requested.

Claim Rejection, 35 USC 102

Claims 1-12 stand rejected based on 35 USC 102(b) as anticipated by Andersson, U. S. Patent 5,603,805, Alexander et al, U. S. Patent 3,007,878 and WO 00/20221. This ground of rejection is respectfully traversed.

The WO '221 reference clearly represents pertinent prior art to the present invention, because the reference discloses an aqueous silicon dioxide solution that is stable in the acid range. The reference on page 3 discloses an aqueous dispersion of cationic silica with the dispersion having a pH ranging from about 2 to about 6. The dispersion is produced by bringing the silicon dioxide particles into contact with aluminum compounds in an aqueous medium as described on pages 11 and 12 of the reference. As stated at page 12 of the reference, the fact of the cationic coating of the silicon dioxide particles with aluminum and the extent to which the silicon dioxide particles are coated with aluminum is provided by measuring the zeta potential of the dispersion of the silica being cationized (page 12, lines 18-20 and Fig 1). Example 1 of the reference is particularly instructive, because it describes the "titration" of an aqueous silica suspension with $\text{Al}_2(\text{OH})_5\text{Cl}$ (2 M solution) which is followed by constant measurement of the zeta potential of the suspension. The starting silica

suspension is said to have a zeta potential of about -2 mV and as aliquots of the aluminum chlorohydrate solution are added, the zeta potential steadily increases. After the first addition of aluminum chlorohydrate solution, the zeta potential is already at about 9 mV and with subsequent additions, the zeta potential increases to about 28 mV. The zeta potential achieves a plateau near 30 mV which the reference at the top of page 33 is an indication that the aqueous dispersion of the invention is achieved. It is therefore clear that the present invention differs from that of the reference on the basis of the extent of the coating of the silica particles since in the present claims the zeta potential must be less than or equal to zero. Thus, the reference does not anticipate the claimed aqueous dispersion of the present invention.

The Examiner states that at some point the silica suspension possesses a negative zeta potential, thus meeting the zeta potential limitation of the present claims. However, where the reference does describe a negative zeta potential of -2 mV, it must be observed that this zeta potential is of a silica suspension that has **not** been treated with aluminum chlorohydrate solution. Once addition of aluminum chlorohydrate to the aqueous suspension begins in aliquot portions, the zeta potential immediately increases so that at the end of the first aliquot of aluminum chlorohydrate solution (of three ml as described in Example 1) the zeta potential rapidly soars to a zeta potential of 9 mV which is well above the maximum zeta potential of the present claims of zero. At no point in this first addition of aluminum chlorohydrate solution can it be said that any type of homogeneous solution is formed at one or more zeta potentials. Thus, there is no evidence whatever that by the method described in the examples of the reference, that one or more homogeneous solutions are formed as intermediate solutions having a specific zeta potential. Certainly, the examples of the reference would not lead the skilled artisan to expect that by following the procedure of Example 1 of the reference, that at some small addition of aluminum chlorohydrate solution to a dispersion of silica particles a homogeneous mixture could and would be formed that has a zeta potential of

zero or less. To the contrary, the suspension of the reference which is said to be the desired product is a suspension that has a positive zeta potential near 30 mV! The reference therefore does not anticipate the present invention and withdrawal of the rejection based on this reference is respectfully requested.

As to the matter of the Andersson et al patent, although an aqueous sol of silica particles is disclosed, the characteristic of the suspension of the reference is quite different from the features which define the claimed aqueous dispersion of the present invention. In fact, the silica sol of the reference is characterized by the suspended silica particles having a specific surface area of 300 to 700 m²/g and a microgel content. It is this material which when combined with a cationic acrylamide polymer exhibits a desired improved effect (col 1, lines 51-64). There is no description anywhere in the reference of anything like the claimed aqueous suspension of the present invention. The reference does mention that a possible modification of the silica suspension is that after the suspension is prepared in which the silica particles are within the desired size range, modification of the surface of the particles can be achieved by treatment with an aluminum compound in order to give the particles an better charge stability in an acid environment. The reference only speaks in terms of a modifying effect on the order of from 2 to 25 %, particularly 3 to 20 % (col 4, lines 1-14). There is no description of the quantity of cation-providing compound amount of the present claims of 0.001 to 0.1 mg per m² of silicon dioxide surface in the patent.

Applicants note that the patent teaches a ratio of aluminum compound to SiO₂ of 0.01 to 1 in column 5. However, this is a weight ratio and not a ratio of the weight of polyvalent metal oxide to surface area of silica particles. Further, of the three experiments that constitute Example 1 of the patent, only the third describes an aluminum modified silica. Here, however, a very substantial amount of aluminum compound is added to the silica sol, and the so, before addition of sodium aluminate, had a pH of 7.2, which is clearly not an acidic pH.

Clearly, Anderson et al does not describe the present invention as claimed and withdrawal of the rejection based on this reference is respectfully requested.

Finally, the Alexander et al patent describes an aqueous colloidal silica sol in which silica particles are coated with a polyvalent metal oxygen compound. The particles are positively charged particles and have a positive zeta potential. On the other hand, the zeta potential of the present aqueous dispersion has values less than or equal to zero. Thus, the particles of the present dispersion are neutral or anionic with the zeta potential being zero or negative. As described in the paragraph of lines 46 to 70 of column 4 of the patent, the proportion of basic metal salt that is mixed with the silica aquasol is such that the mole ratio of metal atoms in the salt to silica in the aquasol ranges from 2×10^{-5} :1 to 2×10^{-3} :1. At the level of 2×10^{-5} :1, this translates into an amount of basic metal salt that is sufficient to correspond on a mole basis of coating 2.4 % of the silicon atoms on the surface of the silica particles. For a sol that is constituted of silica particles having a surface area of $200 \text{ m}^2/\text{g}$, the proportion of aluminum atoms to silica in the aquasol ranges from 0.004:1 to 0.4:1 on a molar basis. On the other hand, in the present invention, acidic metal salts can be used.

It should also be noted in the reference in column 3, lines 12 et seq describes silica sol particles of a specific type whose surface area, as determined by nitrogen absorption, is inversely proportional to average particle diameters. The particles are of a specific kind which are substantially discrete. This is a point of distinction between the invention and the reference.

It should also be noted that in the present invention the zeta potential on the particles, after adding the cation-providing compound, is more negative than the silica dispersion alone. (See Table 2 on page 17 of the text.)

With respect to the addition of metal salt, the amount added as taught in the reference is within the scope of the present invention. However, the particles of the reference have a charge which is different from the neutral to anionically charged particles of the invention. This means that the materials of the present claims must be different from the materials of the reference. Accordingly, it is clear that the reference does not anticipate the present invention as claimed and withdrawal of the rejection based on this reference is respectfully requested.

It is now believed that the application is in proper condition for allowance. Early notice to this effect is earnestly solicited.

Respectfully submitted,

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